Feeding behavior of caribou calves does not compensate for low forage quality

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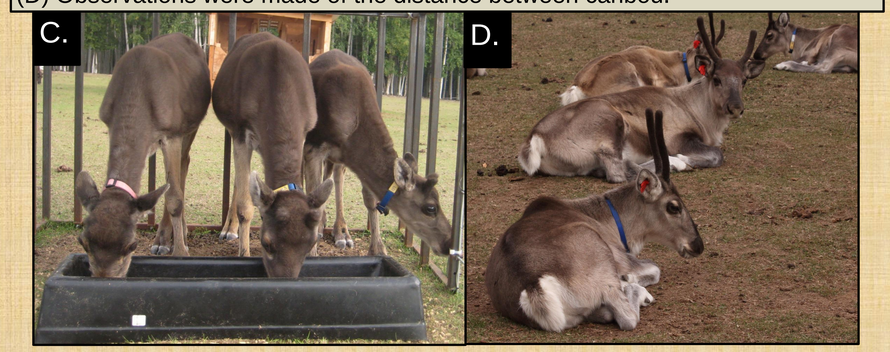
Introduction

- Habitat quality affects population growth of caribou *(Rangifer tarandus granti).*[1] Recruitment of calves depends on growth and the transition from milk to solid foods before winter.
- We observed 14 caribou calves to monitor consumption of milk and solid food from birth to 14 weeks of age.
- We tested the hypothesis that calves provided with low quality diets (low energy or low energy and low protein) would compensate by
  1. increasing the frequency of suckling or grazing
  2. increase their time spent with their mothers for feeding

when compared with calves given a high quality diet with adequate energy and protein.

Figure 1 . Calves were observed consuming (A) milk , (B) grass and (C) pellets. (D) Observations were made of the distance between caribou.



Methods

- We studied 7 male and 7 female calves to monitor consumption of milk and solid foods from birth to 14 weeks of age (Fig. 1).
- Calves were held with their mothers in three contiguous pens of 1.5 ha each covered with *Salix spp. and Betula spp.* woodland and 37% pasture (*Bromus spp.*).
- Each pen was provided with pelleted rations to vary digestible energy (16 vs. 12 kJ/g dry matter) and protein (15.2 vs. 7.6% of dry matter) that simulated the quality of summer forages consumed by wild caribou:
  - high energy and protein (HEHP = browse e.g. *Salix spp.*)
  - low energy and protein (LELP = senescent graminoids e.g. Carex *spp.*)
  - low energy high protein (LEHP = emergent graminoids similar to the pasture
- We observed the behavior of each calf in the morning (08:00), afternoon (14:00) and evening (20:00h) each day for a total of 3,958 records.
- Cow-calf and calf-calf distances were ranked as either < 10 or >10 body lengths from 4 weeks of age.
- Body mass was measured twice each week (± 0.02 kg).

Figure 2. Sum of observations of milk, grass, and pellet consumption from birth to14 weeks of age in 14 calves.

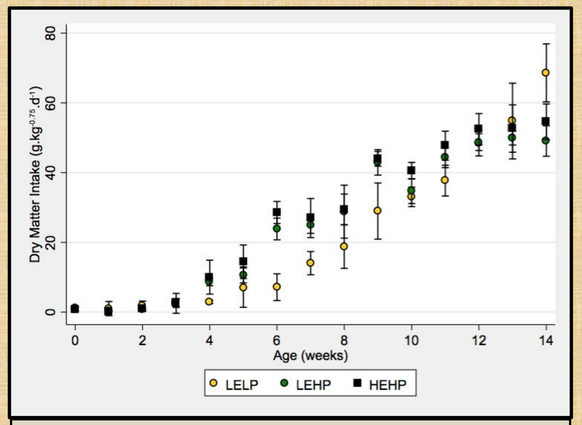


Figure 3. Daily intake (mean ± sd) of pelleted food by calves in each pen.

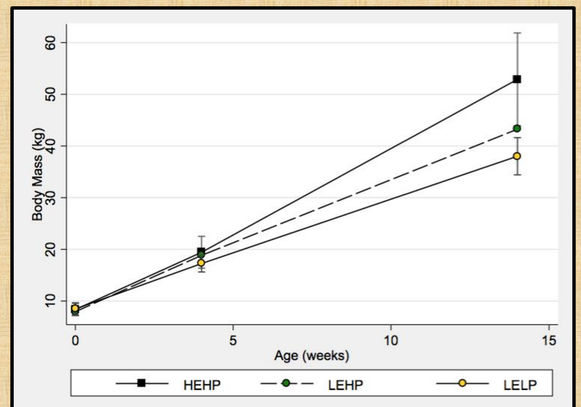


Figure 4. Diet quality did not affect body mass (mean ± sd) of calves at birth or at 4 weeks of age. Calves on HEHP diet were larger than those on LELP diet at the end of summer at 14 weeks of age.

Results

- Observations of suckling declined from 18% to 3% as those of grazing inclined from 4% to 28% from birth to 5 weeks of age (Fig. 2).
- Calves were excluded from the rations provided to their mothers but were fed the same rations in “creep feeders” that excluded mothers.
- Observations of calves feeding on the pelleted rations increased over the first 4 weeks. Daily intakes of pellets by calves in each pen increased slowly over the first 4 weeks (Fig. 3).
- Increasing observations of solid food consumption are consistent with the development of ruminal function by 4 weeks of age[2,3] (Fig. 2).
- Calves were greater than 10 body lengths away from their mother for 23 -30% of observations. Separations between mothers and calves increased from morning to evening. Separations between calves were 19-26% of observations that also increased during the day
- Calves over 4 weeks of age aggregated in the morning and were typically bedded in groups (Fig 1D). Animals segregated as they began foraging in the afternoon and the evening.
- Growth (mean ± sd) was significantly slower on the low quality LELP diet (0.30 ± 0.04 g/d) than the high quality HEHP diet (0.46 ± 0.08 g/d). Growth rates were similar among pens to 4 weeks of age. Calves fed LELP ate less than those in the other pens from week 5 to 8 but all intakes were high and similar after week 9. Calves provided with HEHP ration grew faster than those on the low quality diets from 4 to 14 weeks of age when suckling frequencies were low (Fig. 4).

Conclusions

- Feeding behavior was not affected by diet treatment, which suggests that calves were not able to compensate for low quality food by foraging or suckling more frequently.
- Caribou are most vulnerable to declines in diet quality after 4 weeks of age when suckling frequency declines and growth must be supported by solid food through late summer.
- Slow growth of calves through summer reduces the size of calves entering winter, which may reduce winter survival and thus impair recruitment or delay reproduction.[4,5]

References

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